YOGHURT PRODUCTION FOR SMALL-SCALE MILK PROCESSORS

BY

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INTRODUCTION

Milk provides a ready source of nutrients, particularly protein, calcium, phosphorus and lactose. In a developing country such as Nigeria where protein intake is generally low, milk is an invaluable source of supplementation. Milk is highly perishable, thus necessitating its immediate consumption, mostly fresh. However, milk can also be processed into fermentable products such as yoghurt, butter and cheese which have improved keeping quality and nutritive value.

In addition to its keeping quality and nutritive value, yoghurt has therapeutic and prophylactic effects on intestinal ailments in humans. It helps in the alleviation of lactose intolerance and improves calcium absorption. Due to its low pH (4.6) and lactic acid content (1-1.2%). yoghurt also serves as an antibiotic. For the small-scale milk processors, yoghurt provides a ready source of income.

A small-scale milk processing model at the Dairy Research Programme, National Animal Production Research Institute, Shiga, was initiated in June, 1994 utilizing milk produced by the dairy herd. A little over a year later, milk collection from smaller- holder farmers in Zaria was incorporated to boost the quantity of milk processed. The objectives of this paper is to present a simple, step-by-step procure for processing milk into yoghurt for small-scale farmers. Furthermore, the paper aims at presenting the results of the NAPRI milk collection and processing data collected over a five-year period to ascertain the profitability and viability of the venture.

METHODOLOGY

Milk Quality Tests: Take a small sample of fresh milk in a cup and check for adulteration by dipping a finger. Normal, good quality milk leaves a retaining film on the finger. Discard the sample and properly wash the cup with hot water. Sieve the milk with a while, clean, and dry cotton cloth to remove any hidden sediments and particles. Next, check for purity with the 'clot-on-boiling' test. In other words, if you heat a sample of the milk to boiling point without clotting, then the milk is good. If for any reason, the cows had been treated

with antibiotics, do not use their milk for processing until after one week of withdrawal of the treatment.

Pasteurisation: This is the process of killing thermophilic and the thermoduric species of bacteria that easily spoil milk by raising the temperature of the milk and rapidly cooling it down. Heat the milk in a covered pot (do not let it boil). Immerse the heated milk in a basin of running tap water to rapidly cool the milk. With the use of a thermometer, check that the temperature is down to 45 C. In situations where a thermometer is unavailable, let a few drops of the milk on the back of your hand. If this does not hurt, then the milk is adjudge to be at a temperature of 45 C. Allow the milk to cool down for approximately one hour with the tap water still running.

This is known as standardisation. Finally use a ladle to scoop off the floating cream. Inoculation: This is the process of introducing a strain of useful bacteria that aids milk fermentation. Mix the pasteurized milk with yoghurt obtained from a very reliable source (e.g. NAPRI) and stir properly.

Incubation: Pour boiling water into a food flask and cover. The aim is to sterilise the flask and warm it. Ensure that all other containers and spoons that will come in contact with the milk are also properly sterilised with boiling water. After Inoculation of the pasteurized milk with yoghurt culture, pour the innoculated milk into the pre-heated food flask. Cover and allow it to coagulate within 2 to 3 hours. If the container is not a food flask, lag properly to prevent heat loss. Immerse the container in a bucket of warm water to keep the mixture at about 45 C.

Cooling: After coagulation, allow the yoghurt to cool in a refri- gerator at about 5 C overnight.

Flavoring: Add sugar to taste and stir properly.

Packaging: Package the yoghurt into sterile containers and store in a refrigerator at 5 C until required for consumption.

ECONOMIC ANALYSIS

Income and profit of milk collected from smallholder farmers and the NAPRI dairy herd in Zaria, as well as yoghurt, cheese, butter and pasteurized milk produced between June 1996 and February 1999 were analysed. The location of Shika, management practices, dairy and growth performances of the cattle in the NAPRI dairy herd had been reported previously (Ehoche et al, 1996a and Malau-Aduli et al., 1996b).

The milk collection process commenced early in the morning using a motor cycle to go round neighbouring villages in Zaria. The milk sellers were paid on the spot once the quality of the milk met the standard. The major quality indicators used by the collector were the milk density reading on the lactometer and the dipping of a finger in a sample of the milk in a small cup. Normal unadulte rated milk left a retaining film on the finger and had a actometer reading of 0.09-0.20. In the milk processing laboratory, the 'clot-on-boiling' test was carried out to further check the purity of the milk after sieving it with a clean filter cloth. Thereafter, the milk was pasteurized, inoculated with a starter culture, cooled, flavoured and packaged. The processed milk products were sold and consumed locally in Zaria.

DISCUSSION

A total of =N=1,259,867.00 income was realised from the combined sales of yoghurt, cheese, butter and pasturised milk (Table 1). Yoghurt accounted for the most income of =N=1,151,907 while cheese was the least (=N=1,460).

TABLE 1: INCOME FROM THE SALE OF MILK PRODUCTS (1996-1999)

Product	Quantity (Sachets)	Income (=N=)
Yoghurt	45,485a	1,151,907a
Cheese	21b	1,460b
Butter	62c	3,720c
Pasteurized milk	4,250b	102,860b

Column means with different superscripts differ significantly (P<0.01)

From Table 1, there certainly was a consumer preference for yoghurt more than any other product since it yielded the most income.

This might perhaps be partly due to the fact that fermented milk ('nono') around Zaria is a popular diet and the quality of NAPRI yoghurt appeals to many. Another possible reason is that the procedure for yoghurt production is by far more straight forward and less time-consuming that for butter or cheese, hence most of the milk gets processed into yoghurt instead of butter and cheese whose demands are negligible.

Whereas Table 1 gives a total income realised from sales, it was difficul to individually allot the cost of production of each milk product since all th products were processed from the same milk collected. However, when the effect of season and year were tested on income, expenditure and sales, clearer pictur of the cost of production was evident (Table 2).

TABLE 2: SEASONAL AND YEARLY VARIATIONS IN MILK PRODUCTS SALES (=N=).

	Quantity (Sachets)	Income	Expenditure	Gross margin
Overall Means	49818	1259867	812665	447202
Season:				
Wet	18018a	459515a	281449a	178066a
Dry	13233b	332795b	221665.5c	111129.5c
Harmattan	18567a	467557a	309550.5b	158006.5b
Year:				
1996	9429c	241705c	173560.5c	68144.5c
1997	18142b	463490b	339882.5a	123607.5b
1998	20661a	515022a	279150b	235872a
1999	1586b	39650d	20072d	19578d

Column means within a given variable with different superscripts differ significantly (P<0.01).

Wet season = June-September
Harmattan = October-January
Dry = February-May

Overall, a profit of =N=447,202 was realised during the period of the stuc (Table 2). The highest profit was obtained during the wet season and the leas in the dry season. This observation follows the expected trend since good qualit pasture is available during the wet season. Besides, milk is cheaper to buy a this time since the cost of supplementary feeding is low. Also, during the we season, there are usually more cows in milk than at any other season in the NAPF dairy herd due to the breeding programme which is planned in such a way that cow calve during the wet season.

Yearly differences were also significant (Table 2), with 1998 producing th most profit of =N=235,872. There were differences in management in differer years since the earlier years were used in procuring equipment.

It can be concluded that overall, the NAPRI milk collection and processing model was a profitable and viable venture. Also, consumer preference for yoghurt over and above cheese, butter and pasteurized milk necessitates a strengthening of yoghurt production. Since the highest gains were realised during the wet season, it is suggested that milk collection and storage facilities should be expanded and intensified during this period.

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